

TREK

GETTING STARTED GUIDE



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1 Welcome

The Telescience Resource Kit (TReK) is a suite of software applications and libraries that can be used to monitor and control assets in space or on the ground.

1.1 About TReK

TReK provides support for various data interfaces including UDP, TCP, and serial interfaces. Data capabilities include support to receive, process, record, playback, forward, and display data (ground based data or telemetry data). Command capabilities include support for creating, modifying, storing, and uplinking a variety of command products such as commands, command files, command loads, and command timelines. Command capabilities also include monitoring, recording, and tracking command activity. Databases and files can be used to store metadata (data definitions and command definitions). Post processing support is included for working with recorded data. An Application Programming Interface (API) provides a bridge for users to develop software to access and extend TReK services.

1.2 About this Guide

This guide introduces the TReK applications and libraries available in this release. It also provides information about where the TReK software is installed, the documentation that is available, and suggestions for getting started with TReK.

1.3 Important Background Information for this Release

Between 1997 and 2002, several versions of TReK software (TReK Release 1 – TReK Release 3) were developed and released into operation in support of the International Space Station program. This software was developed to run on Windows. In 2013, an Engineering Change Request was approved to provide TReK on Linux. The new cross platform version of TReK software is currently in work and will be deployed in phases during the 2014-2016 timeframe. This will include multiple beta releases that precede each incremental operational release.

The new TReK cross-platform software is composed of the TReK Toolkit, the TReK Desktop, and TReK Mobile.

TReK Toolkit

The TReK Toolkit is a suite of lightweight libraries and utility applications. It will include capabilities to access International Space Station payloads using standard network protocols and services, support for delay tolerant networking, and support for EXPRESS Payload to ISS C&DH System Ethernet interfaces. The TReK Toolkit is suitable for use on the ground and onboard ISS. The TReK Toolkit is a subset of the TReK Desktop. Capabilities in the TReK Toolkit portion of the TReK software will be delivered in phases.

TReK Desktop

TReK Desktop provides the complete set of TReK capabilities in a Windows and Linux environment. This includes existing capabilities and enhancements based on user requests and lessons learned.

TReK Mobile

TReK capabilities available in a mobile environment (Android & IOS). This is a new area that is expected to evolve over time. Work is in progress to evaluate possible architectures and gather an initial set of requirements.

You are currently reading the Getting Started Guide for the TReK Toolkit. This version of the TReK Toolkit includes the following:

Software	Description
CFDP Application	Provides capabilities to perform file transfer functions using the CCSDS File Delivery Protocol (CFDP). This application has a graphical user interface. You can choose to use Native CFDP (CFDP using UDP) or ION CFDP (CFDP over BP).
CFDP Console Application	Provides capabilities to perform file transfer functions using the CCSDS File Delivery Protocol (CFDP). This application is a console application targeted for use onboard ISS. It was provided to serve two purposes: (1) a CFDP console application for customers to use right out of the box, and (2) an example program showing customers how to use the CFDP Library to perform common CFDP functions. You can choose to use Native CFDP (CFDP using UDP) or ION CFDP (CFDP over BP).
CFDP Library	Provides an application programming interface to perform file transfer functions using the CCSDS File Delivery Protocol (CFDP). You can choose to use Native CFDP (CFDP using UDP) or ION CFDP (CFDP over BP).
Data Library	Provides an application programming interface to create, populate, build, and decompose packets. Includes support for pre-defined and custom headers and packets.
Device Services Library	Provides an application programming interface to perform functions such as creating sockets, sending data, receiving data, etc. Includes support for Unicast, Multicast, TCP Listener, TCP Server, and TCP Client.
ERIS Simulator Console Application	The ERIS Simulator Console Application simulates the capabilities provided by the POIC as defined in the Payload to Generic User Interface Definition Document

	(PGUIDD) SSP 50305.
EXPRESS Library	Provides support for the following EXPRESS Payload to ISS C&DH System Ethernet interfaces as defined in SSP 52000-IDD-ERP: Telemetry Generation (including health and status), Command Handling, Ancillary Data, PEP Bundle Request, PEP Procedure Execution Request, and Data Transfer over IP.
GSE Convert Application	Provides the capability to convert a GSE Packet definition downloaded from the POIC in an ASCII file format to a GSE Packet definition in a TReK metadata file format (a format that can be read by the TReK Packet class in the TReK Data API).
HPEG Application	Provides access to HOSC Payload Ethernet Gateway (HPEG) services. This application has a graphical user interface. It provides the capability to log into the HOSC and request HPEG services. This includes selecting a ground node ID (if applicable), starting and stopping services, and enabling and disabling the HPEG Idle Check. Includes support for DTN.
HPEG Library	Provides an application programming interface to retrieve HPEG status information contained in the HPEG application.
IONconfig Application	Provides the capability to generate ION configuration files and scripts. The scripts (Windows batch files and Linux shell scripts) can be used to start and stop ION. This application has a graphical user interface.
IONizer Application	Provides capabilities to start, stop, and monitor ION. This application has a graphical user interface.
IONizer Library	Provides an application programming interface to start, stop, and monitor ION.
TReK Assistant Application	Provides integrated help for all TReK applications and libraries.
User Calibrator Generator Console Application	The User Calibrator Generator Console Application creates files needed for writing your own calibration code.

1.4 System Requirements

TReK is available for Windows 7 and Red Hat Enterprise Linux 6.x.

2 Technical Support

If you are having trouble installing the TReK software or using any of the TReK software, please try the following suggestions:

Read the corresponding material in the manual and/or on-line help.

Ensure that you are correctly following all instructions.

Checkout the TReK Web site at <http://trek.msfc.nasa.gov/> for Frequently Asked Questions.

If you are still unable to resolve your difficulty, please contact us for technical assistance:

TReK Help Desk E-Mail, Phone & Fax:

E-Mail:	trek.help@nasa.gov
Telephone:	256-544-3521 (7:00 a.m. - 3:30 p.m. Central Time)
Fax:	256-544-9353

TReK Help Desk hours are 7:00 a.m. – 3:30 p.m. Central Time Monday through Friday. If you call the TReK Help Desk and you get a recording please leave a message and someone will return your call. E-mail is the preferred contact method for help. The e-mail message is automatically forwarded to the TReK developers and helps cut the response time.

3 Overview

Each TReK software release is comprised of software, documentation, online help, and example programs. This section provides an overview of each component that makes up the TReK product.

3.1 Software

This section describes the TReK applications and libraries.

CFDP Application

The CFDP Application provides capabilities to perform file transfer functions using the CCSDS File Delivery Protocol (CFDP).

CFDP Console Application

The CFDP Console Application provides capabilities to perform file transfer functions using the CCSDS File Delivery Protocol (CFDP).

CFDP Library

The CFDP Library provides an application programming interface to perform file transfer functions using the CCSDS File Delivery Protocol (CFDP).

Data Library

The Data Library provides an application programming interface to work with packets. This library provides an easy way to create your own custom packets to use when communicating with your payload.

Device Services Library

The Device Services Library provides an application programming interface to perform functions such as creating sockets, sending data, receiving data, etc.

ERIS Simulator Console Application

The ERIS Simulator Console Application simulates the capabilities provided by the POIC as defined in the Payload to Generic User Interface Definition Document (PGUIDD) SSP 50305.

EXPRESS Library

The EXPRESS Library provides support for the following EXPRESS Payload to ISS C&DH System Ethernet interfaces as defined in SSP 52000-IDD-ERP: Telemetry Generation (including health and status), Command Handling, Ancillary Data, PEP Bundle Request, PEP Procedure Execution Request, and Data Transfer over IP.

GSE Convert Application

The GSE Convert application provides the capability to convert a GSE Packet definition downloaded from the POIC in an ASCII file format to a GSE Packet definition in a TReK metadata file format (a format that can be read by the TReK Packet class in the TReK Data API).

HPEG Application

The HPEG Application provides access to the HOSC Payload Ethernet Gateway (HPEG) services.

HPEG Library

The HPEG library provides an application programming interface to retrieve HPEG status information contained in the HPEG application.

IONconfig Application

The IONconfig application provides the capability to generate ION configuration files and scripts. The scripts (Windows batch files and Linux shell scripts) can be used to start and stop ION.

IONizer Application

The IONizer application provides capabilities to start, stop, and monitor ION.

IONizer Library

The IONizer library provides an application programming interface to start, stop, and monitor ION.

TReK Assistant

The TReK Assistant provides online help for all TReK applications and libraries.

User Calibrator Generator Console Application

The User Calibrator Generator Console Application creates files needed for writing your own calibration code.

3.2 Documentation

The TReK documentation set is comprised of user guides, tutorials, and reference documents. The Getting Started Guide should be read first followed by the tutorials. The user guides are helpful when you are looking for information about a specific capability. Each document is described below.

CFDP Console User Guide

The CFDP Console User Guide provides information about the TReK CFDP Console application.

CFDP Tutorial

This tutorial provides an introduction to CFDP and describes how to transfer a file using Native CFDP.

CFDP User Guide

The CFDP User Guide provides information about the TReK CFDP application.

Data Tutorial

This tutorial provides a high level introduction to concepts associated with telemetry and commanding, processing and building packets, conversion, calibration, and alarms (limit sensing). It includes an overview of the TReK Data Application Programming Interface (API). This includes an introduction to the Data API classes and examples showing how to use the classes to perform telemetry and command functions.

DTN Tutorial

This tutorial provides a high level introduction to Delay Tolerant Networking. It includes a discussion on the DTN network in place to support International Space Station users.

EXPRESS Example Tutorial

This tutorial describes how to set up a TReK EXPRESS library example program and use it with the Common Suitcase Simulator.

Getting Started Guide

The document you are currently reading. This document provides information about getting started with TReK.

GSE Convert User Guide

The GSE Convert User Guide provides information about the TReK GSE Convert application.

HPEG Tutorial

This tutorial provides an introduction to the HOSC Payload Ethernet Gateway (HPEG) service. It describes how to activate the HPEG service and obtain a proxy IP address.

HPEG User Guide

The HPEG User Guide provides information about the TReK HPEG application.

IONconfig User Guide

The IONconfig User Guide provides information about the TReK IONconfig application.

IONizer User Guide

The IONizer User Guide provides information about the TReK IONizer application.

3.3 Online Help

The TReK Assistant application provides integrated online help for all TReK applications and libraries. It includes documents described in section 3.2 and online help for TReK APIs including code examples. All TReK applications also include application specific help.

3.4 Example Programs

Example Programs are provided to show how to use TReK APIs. Some examples target a specific API and others show how to use multiple TReK APIs together. Documentation for examples can be found in the TReK Assistant. Source code for examples can be found in the TReK installation examples directory.

4 Directory Structure

This section provides information about the TReK software installation.

4.1 TReK Installation Directories

The following directories are installed on both Windows and Linux unless otherwise specified. The TReK menu refers to the TReK menu item on the Windows Start menu or the Red Hat Enterprise Linux Applications menu.

The bin Directory

The bin directory contains all of the executables (and dlls on Windows) for the TReK software. This directory contains the applications that are found on the TReK menu and other executables that are needed by these applications.

The config Directory

The config directory contains any configuration files needed by TReK applications.

The doc Directory

The doc directory contains TReK documentation. You can open all of the TReK documents from the TReK menu.

The example Directory

The example directory contains subdirectories for each TReK example. Documentation for the examples can be found in the TReK online help.

Note: Due to file privileges you may need to copy example files located in the TReK installation directory to a user directory for editing or compiling.

The help Directory

The help directory contains binary files needed to support TReK online help.

The include Directory

The include directory contains the include files you need to use the TReK API libraries.

The lib Directory

The lib directory on Windows contains the import libraries you need to link your program with TReK libraries. There are subdirectories for each supported development environment. The lib directory on Linux contains the shared object files you need for linking and running.

The dll Directory (Windows only)

The dll directory on Windows contains the dll files you need to run your program with TReK on Windows. There are subdirectories for each supported development environment. The dll directory is only installed on Windows.

The menu Directory (Linux only)

The menu directory is only installed on Linux. It contains files needed to support the TReK menu on the Red Hat Enterprise Linux Applications menu.

The metadata Directory

The metadata directory contains any files needed by TReK applications and libraries to supply metadata information. Subdirectories exist for each type of metadata.

The script Directory

The script directory contains any script files needed by TReK.

The template Directory

The template directory contains any template files needed by TReK.

4.2 TReK Help Cache

When you run the TReK Assistant, cache files will be stored in the following location:

windows: C:\Users\<username>\AppData\Local\gov.nasa.msfc.trek

Linux: /home/<username>/local/share/gov.nasa.msfc.trek

The cache files are used to store information needed to support the TReK Assistant. In general there is nothing you need to do with this directory. However, if you ever find the TReK Assistant behaving oddly, you can try deleting the gov.nasa.msfc.trek folder to see if this fixes the problem.